

## Abstract of the Disclosure

This invention relates to a generic process for producing a refractory oxide which comprises reacting an aqueous hydrogen fluoride solution or its derivatives with: at least one metal fluoride reactant; or at least one metal fluoride reactant and at least one metal oxide reactant; or at least one metal oxide reactant, to produce either a colloidal mixture or a solution; drying either the colloidal mixture or solution; heating the dried product to produce a solid state metal hydroxyfluoride; heating the hydroxyfluoride to a temperature at which it chemically decomposes into a cationically-homogeneous and nanostructured solid state metal oxyfluoride; and performing one of the following heating steps: (i) to a solid state decomposition-temperature where the oxyfluoride chemically decomposes into a refractory oxide; or, (ii) to a molten state decomposition-temperature where the oxyfluoride chemically decomposes into a refractory oxide; or, (iii) to a vapor state decomposition-temperature where the oxyfluoride chemically decomposes into a refractory oxide.

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